

Amendment
Serial No. 09/822,441

Docket No. US010021

IN THE CLAIMS:

1. (Currently Amended) A method for estimating retransmission timeout (RTO_i) used in a communication system to support multiple retransmission of the same packet between a server and a client, the method comprising the steps of:
 - (a) transmitting a plurality of data packets from said server to said client;
 - (b) transmitting a negative acknowledgment (NACK) packet for retransmission by said client if one of said data packets is missing;
 - (c) computing a round-trip delay (RTT_i) corresponding to a latency between sending said NACK packet to said server and receiving the corresponding retransmission of said missing packet from said server;
 - (d) calculating a plurality samples of delay (Δ_j) between the reception of adjacent packets of said plurality of data packets by said client;
 - (e) determining a smoothed inter-packet delay variance ($SVAR\Delta_i$) based on said calculated delay samples; and,
 - (f) computing said RTO_i based on said determined RTT_i and said determined smoothed inter-packet delay variance.

wherein said $SVAR\Delta_i$ is determined according to $SVAR\Delta_i = (1 - \beta_1) * SVAR\Delta_{i-1} + \beta_1 * D$ and wherein β_1 being set to 0.25 and D being the absolute difference of $\Delta_i - SVAR\Delta_{i-1}$.

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2. (Original) The method of claim 1, further comprising the step of controlling retransmission of said NACK based on said computed RTO_j , said computed RTO_j being a delay between subsequent transmissions of said NACK packet from said client to said server.

3. (Cancelled)

4. (Original) The method of claim 1, wherein said RTO_j is determined according to

$$RTO_j = n * RTT_j + m * SVAR\Delta_j,$$

wherein n being set between 0 and 4 and m being set to $m = 4.2792 * n - 2.6646$.

5. (Original) The method of claim 1, wherein the communication link between said server and said client comprises at least one of a wireless communications link, a wired communication link, and the combination of a wired communication link and a wireless communications link.

6. (Currently Amended) A method for managing transmission of a plurality of data packets over a communications link between a server system and a client system; the method comprising the steps of:

- (a) transmitting a plurality of burst packets from said server to said client;
- (b) transmitting a negative acknowledgment (NACK) packet for retransmission by said client if one of said burst packets is lost;

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(c) determining a round-trip delay (RTT_i) corresponding to the actual time between the transmitting said NACK packet by said client and a determination by said client said lost burst packets was transmitted successfully;

(d) calculating a plurality samples of inter-burst delay (Δ_j) between the reception of adjacent burst packets of said plurality of burst packets by said client;

(e) determining a smoothed inter-burst delay variance ($SVAR\Delta_j$) based on said calculated inter-burst delay samples; and,

(f) computing said RTO_j based on said determined RTT_i and said determined smoothed inter-burst delay variance,

wherein said $SVAR\Delta_j$ is determined according to $SVAR\Delta_j = (1 - \beta_1) * SVAR\Delta_{j-1} + \beta_1 * D$ and

wherein β_1 being set to 0.25 and D being the absolute difference of $\Delta_j - SVAR\Delta_{j-1}$.

7. (Original) The method of claim 6, further comprising the step of controlling multiple retransmission of said NACK based on said computed RTO_j , said computed RTO_j being a delay between subsequent transmissions of said NACK packet from said client to said server.

8. (Cancelled)

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9. (Original) The method of claim 6, wherein said RTO_j is determined according to

$$RTO_j = n * RTT_i + m * SVAR\Delta_j,$$

wherein n being set between 1 and 4 and m being set to $m = 4.2792 * n - 2.6646$.

10. (Original) The method of claim 6, wherein said communication link between said server and said client comprises at least one of a wireless communications link, a wired communication link, and the combination of a wired communication link and a wireless communications link.

11. (Currently Amended) A system for estimating retransmission timeout (RTO) used in a communication system to support multiple retransmission of the same packet between a server system and a client system, comprising:

means for controlling said multiple retransmissions of a data packet between said server system and said client system over said communication link based on an actual around-trip delay (RTT) and a smoothed inter-packet delay variance ($SVAR\Delta_j$) associated with said client system, said RTT being a latency between sending a negative acknowledgment (NACK) packet to said server system responsive to a lost packet and receiving the corresponding retransmission of said lost packet from said server, said smoothed inter-packet delay variance ($SVAR\Delta_j$) being variation of delays before and after each received packet or burst of packets, wherein said $SVAR\Delta_j$ is determined according to $SVAR\Delta_j = (1 - \beta_1) * SVAR\Delta_{j-1} +$

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$\beta_1 * D$ and wherein β_1 being set to 0.25 and D being the absolute difference of $\Delta_i - SVAR\Delta_{i-1}$.
~~whereby the over estimation and under estimation of said RTO is relatively minimized.~~

12. (Currently Amended) A system for managing transmission of a plurality of data packets over a communications link between a server system and a client system, comprising:

means for receiving said data packets in the form of frame comprised of packets;
means for determining whether any frame packets were lost during transmission;
means for requesting that any lost frame packets be retransmitted;
means for determining a round-trip delay (RTT_i) corresponding to a latency between requesting retransmission of said lost frame to said server and receiving the corresponding retransmission of said lost frame from said server;
means for determining inter-burst packet delay variations; and,
means for determining a retransmission timeout (RTO_i) based on said determined RTT and said determined inter-burst delay variations;
means for determining an inter-burst delay (Δ_i) between the reception of a first packet of said lost burst packets and a last packet of a prior burst packets; and,
means for determining a smoothed inter-burst delay variance ($SVAR\Delta_i$),
wherein said $SVAR\Delta_i$ is determined according to $SVAR\Delta_i = (1 - \beta_1) * SVAR\Delta_{i-1} + \beta_1 * D$ and wherein β_1 being set to 0.25 and D being the absolute difference of $\Delta_i - SVAR\Delta_{i-1}$.

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13. (Cancelled)

14. (Original) The system of claim 12, further comprising a means for controlling multiple retransmission of said NACK based on said computed RTO_j , said computed RTO_j being a delay transmission of said NACK packet from said client to said server.

15. (Cancelled)

16. (Original) The system of claim 12, wherein said RTO_j is determined according to

$$RTO_j = n * RTT_j + m * SVAR\Delta_j$$

wher cin n being set between 1 and 4 and m being set to $m = 4.2792 * n - 2.6646$.